Sustainability Roadmap 2018-2019:

Climate Change Adaptation

Progress Report and Plan for Meeting the Governor's Sustainability Goals for California State Agencies

Cal Expo

Edmund G. Brown Jr., Governor

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Cal Expo
Sustainability Road Map 2018-2019:
Climate Change Adaptation

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Acronyms

AB	Assembly Bill
EHT	Extreme Heat Threshold
EO	Executive Order
GCM	Global Circulation Model
GHG	Greenhouse Gas
RCP	Representative Concentration Pathway
SB	Senate Bill

EXECUTIVE SUMMARY

The California Exposition & State Fair (Cal Expo) mission is to create a State Fair experience reflecting California including its industries, agriculture, and diversity of its people, traditions, and trends shaping its future supported by year-round events.

The Governor has directed California State Agencies to demonstrate sustainable operations and to lead the way by implementing sustainability policies set by the state. Some of the steps Cal Expo has already taken to integrate climate considerations in our planning such as:

1. Heating Ventilation and Air Condition Migration
2. Facility Irrigation Study
3. Solar Power Usage
4. Facility/Infrastructure Study

We live in a world in which the climate is changing at a rate faster than that which society has experienced in modern history. To address these challenges, Cal Expo has developed a Climate Change Adaptation Roadmap. The Adaptation Roadmap relies on peer reviewed scientific information and expert judgment to begin to identify potential vulnerabilities to Cal Expo's strategies in facing climate change. The Adaptation Roadmap also presents priority actions Cal Expo will take to integrate climate adaptation planning into its project planning and facility management; including policies, rules, and operations to ensure they are effective in a changing climate. Cal Expo's focus on climate adaptation is part of a larger State effort to promote a healthy and conservationist approach that is resilient to a changing climate. Cal Expo's Climate Change Adaptation Roadmap provides a planning document and commitment from Cal Expo to addressing the direction provided in the Governor's Sustainability Initiatives to plan for future changes in climate and to mainstream considerations of climate change into our activities. As part of that effort, Cal Expo's vision is to continue to fulfill its commitment to protecting human health and the environment even as the climate changes. Cal Expo will build and strengthen its **adaptive capacity** and work with its partners and stakeholders in building strong adaptive policies supporting the Governor's initiatives. Cal Expo will empower its staff and partners by increasing their awareness of ways that climate change may affect their ability to implement effective planning processes, and by providing them with data, information, measuring outcomes and tools to integrate climate adaptation into their work.

Executive Director Signature

Rick K. Pickering
Executive Director

SUSTAINABILITY GOALS

The Governor has directed California State Agencies to demonstrate sustainable operations and to lead the way by implementing sustainability policies set by the state. Sustainability includes the following general initiatives:

- Greenhouse Gas Emissions Reductions
- Climate Change Adaptation
- Building Energy Efficiency and Conservation
- Indoor Environmental Quality (IEQ)
- Water Efficiency and Conservation
- Monitoring Based Building Commissioning (MBCx)
- Environmentally Preferable Purchasing (EPP)
- Financing for Sustainability
- Zero Emission Vehicle (ZEV) Fleet Purchases
- Electric Vehicle Charging Infrastructure
- Monitoring and Executive Oversight

The Governor has issued numerous executive orders directing sustainable state operations. The order relevant to climate adaptation is:

Executive Order B-30-15

EO B-30-15 declared climate change to be a threat to the well-being, public health, natural resources, economy, and environment of California. It established a new interim statewide greenhouse gas emission reduction target of 40 percent below 1990 levels by 2030, and reaffirms California's intent to reduce greenhouse gas emissions by 80 percent below 1990 levels by 2050. To support these goals, this order requires numerous state agencies to develop plans and programs to reduce emissions. It also directs state agencies to take climate change into account in their planning and investment decisions and employ life-cycle cost accounting to evaluate and compare infrastructure investments and alternatives. State agencies are directed to prioritize investments that both build climate preparedness and reduce GHG emissions, prioritize natural infrastructure, and protect the state's most vulnerable populations.

Legislative Direction

Several pieces of legislation were signed in 2015-16 that codified several elements of the EO. These include the following:

- Assembly Bill (AB) 1482 (Gordon, 2015): Requires that the California Natural Resources Agency (CNRA) update the State's adaptation strategy, Safeguarding California, every three years. Directs State agencies to promote climate adaptation in planning decisions

and ensure that state investments consider climate change impacts, as well as the use of natural systems and natural infrastructure. (Public Resources Code Section 71153)

- Senate Bill (SB) 246 (Wieckowski, 2015): Established the Integrated Climate Adaptation and Resiliency Program within the Governor's Office of Planning and Research to coordinate regional and local efforts with state climate adaptation strategies to adapt to the impacts of climate change. (Public Resources Code Section 71354)
- SB 2800 (Quirk, 2016): Requires State agencies to take the current and future impacts of climate change into planning, designing, building, operating, maintaining, and investing in state infrastructure. CNRA will establish a Climate-Safe Infrastructure Working Group to determine how to integrate climate change impacts into state infrastructure engineering. (Public Resources Code Section 71155)

State Resources and Guidance Documents

California has invested significant resources in understanding the risks of climate change to the State and actions available to respond to and reduce these risks. These include the following:

- **Safeguarding California**: The State's climate adaptation strategy organized by sector. Each sector identifies risks from climate change and actions to reduce those risks.
- **Safeguarding California Implementation Action Plans**: Directed under EO B-30-15, the Implementation Action Plans outline the steps that will be taken in each sector to reduce risks from climate change.
- **Building a Resilient California**: Prepared under direction of EO B-30-15, this document provides a framework for State agencies to integrate climate change into planning and investment, including guidance on data selection and analytical approach.
- **California's Climate Change Assessments**: California has completed three comprehensive assessments of climate change impacts on California. Each assessment has included development of projections of climate impacts on scale that is relevant to State planning (i.e., downscaled climate projections). These data are available through Cal-Adapt, an online data visualization and access tool.

CLIMATE CHANGE ADAPTATION

Executive Order B-30-15 directs State Agencies to integrate climate change into all planning and investment. Planning and investment can include the following:

- Infrastructure and capital outlay projects
- Grants,
- Development of strategic and functional plans,
- Permitting,
- Purchasing and procurement,
- Guidance development,
- Regulatory activity,
- Outreach, and education.

This template will focus on the first three of these activities, and follows the guidance created by the Technical Advisory Group developed under EO B-30-15 to assist State Agencies to complete this task.

Climate Change Risks to Facilities

For all infrastructures, it is important to assess the risk that a changing climate poses to an asset or project (e.g., sea level rise or increasing daily temperatures). It is also important to recognize the impact that an infrastructure project has the surrounding community and the impacts on individual and community resilience (e.g., heat island impacts).

To determine how to consider climate change for a given project or plan or existing infrastructure, this department will consider the following screening questions.

1. What is the lifetime of the facility, planned project or plan?
2. Could it be affected by changing average climate conditions or increases in extreme events over its lifetime?
3. What is the consequence of that disruption?
4. Will that disruption affect vulnerable populations, critical natural systems, critical infrastructure, or other assets?
5. Will that disruption cause irreversible effects or pose an unacceptable risk to public health and safety?

Cal Expo currently is partnering with the California Fair Services Authority (CFSA) for major planning projects with facility planning, capital outlay, and facility operations. During the overall review and planning process CFSA adheres to the Title 24 requirements, part 6 of the California Building Standards Code for the California Energy Code.

Some of the steps Cal Expo has already taken to integrate climate considerations in our planning and investing:

Heating Ventilation and Air Condition migration - Cal Expo has a number of large facilities on the State Fair grounds that require heating and cooling for community use. It is imperative that Cal Expo invest in energy efficient HVAC systems that are environmental friendly.

Facility Irrigation Study - Cal Expo recently contracted with Turf Pro Landscape Professionals, utilizing a government grant. That evaluation provided Cal Expo with both a roadmap for irrigation repairs and upgrades to help with water conservations and smart technologies for irrigation for the thousands of square feet of landscaping.

Solar Power usage - Cal Expo recently installed 14 level one electric vehicle chargers using the power of SMUD's solar panel infrastructure. This project is discussed more in the Sustainability Roadmap: Zero Emission Vehicle Report.

Facility/Infrastructure Study - Cal Expo has recently begun engagement with the Sierra West Group. The construction consultant completed a 'state of the facility report' identifying opportunities for infrastructure improvements with focus on sustainability in project planning.

Understanding Climate Risk to Existing Facilities

Risk from Increasing Temperatures

Under a changing climate, temperatures are expected to increase - both at the high and low end. As a result, facilities will experience higher maximum temperatures and increased minimum temperatures.

Table 1: Top 5 Facilities Most Affected by Changing Temperature

Facility Name	Annual Mean Maximum Temperature (1961 - 1990)	Annual Mean Max T (2070-2099)
Cal Expo	72.4	79.8

In addition to changing average temperatures, climate change will increase the number of extreme heat events across the State. Extreme events are likely to be experienced sooner than changes in average temperatures. Cal Expo has several large structures both in widths and heights that require large HVAC systems to run for long periods of time for cooling and heating purposes - many were built in the 1950's and require immediate attention and upgrades or outright replacement to meet today's building efficiency standards. But like many commercial-grade systems the cost of energy-efficient replacement will have a substantial financial impact to the overall Cal Expo budget. Moreso, as time goes on, Cal Expo will begin to experience the legislative environmental requirements (Local, State, and Federal levels). For example, under the terms of the Montreal Protocol, the U.S. agreed to meet certain obligations by specific dates that will affect the heat pump and air-conditioning industry:

January 1, 2015:

The Montreal Protocol requires the U.S. to reduce its consumption of HCFCs by 90% below the U.S. baseline.

January 1, 2020:

The Montreal Protocol requires the U.S. to reduce its consumption of HCFCs by 99.5% below the U.S. baseline. Refrigerant that has been recovered and recycled/reclaimed will be allowed beyond 2020 to service existing systems, but chemical manufacturers will no longer be able to produce R-22 to service existing air conditioners and heat pumps. Air conditioning systems built after 2010 use R410A refrigerant, which meets Environmental Protection Agency (EPA) standards. Unfortunately, R-22 and R-410A refrigerants are not interchangeable and cannot be mixed in the same HVAC system. Because of the difference in the heat-transfer properties and lubricating oils a system designed to use R-22 will fail quickly if filled with R-410A and vice versa. Cal Expo, like many other state agencies will have to consider the cost of repair or replacement options. Cal Expo will consider the age of each system and the type of refrigerant used. The price of R22 is likely to continue to soar as production is banned and the demand for reclaimed R22 increases, in addition, Cal Expo will have to consider the long term effects of maintaining and operating R22 systems as a 'grandfathered system' and beyond the useful life in the context of cost/expense. The timeline for replacement will vary based on the age, condition and uses of the system; however, maintenance costs will continue to increase. Overall, will Cal Expo find it more cost-effective and energy-efficient to replace an older, breakdown-prone R-22 system with a new R-410A HVAC system.

Because Cal Expo does not receive State or Federal dollars for the purposes of 'normal' operations, it is critical that the department avoids energy disruption. During the hottest months of the year (July/August), there are 17 days of the California State Fair; and during those days the department experiences its largest draw of energy and cooling operations. Cal Expo has hundreds of thousands of square feet of indoor exposition space where nearly 2 million customers/attendees annually will be at risk for heat-related injuries without the cooling systems in place. Additional, about 60% of the annual revenue is obtained during the 17 days of State Fair and therefore it is imperative that HVAC and electrical disruption be avoided. Without the facilities that are both welcoming/comfortable to Fair-goers and the need for revenues to continue annual operations, Cal Expo will not be able to sustain operations. Therefore Cal Expo must find efficient cooling systems to meet the increased regulatory efficiency requirements while maintaining operational needs within a cost-effective approach.

Cal Expo will employ the following strategies to help with the changing temperatures and their impacts on our facility:

1. Migration from R22 refrigerants to a more green-house-gas friendly refrigerants as the need for repair and replacement is required.
2. Consider energy efficient mechanical alternatives for cooling facility's such as low-energy, high-efficient fans.
3. Install automatic doors to exposition centers/facilities to ensure proper cooling containment.
4. Install energy efficient systems utilizing technology to mitigate wasted cooling.
5. Cal Expo utilizes shading structures throughout several thousand square feet of land over the 400 acers of developed fair grounds.

Risks from Changes in Precipitation

Cal Expo recently contracted with Turf Pro Landscape Professionals, utilizing a government grant. That evaluation provided Cal Expo with both a roadmap for irrigation repairs and upgrades to help with water conservations and smart technologies for irrigation for the thousands of square feet of landscaping. Part of the evaluation included a sophisticated weather reader locating on grounds that can identify weather patterns, temperature, and air moisture. This technology allows for the system to take readings and irrigate the many landscapes, avoiding over-watering and water efficiency modeling.

Risks from Sea Level Rise

Increasing global temperatures are contributing to rising sea levels. Rising sea levels will result in inundation of coastal areas and increased flooding due to storm surges. The California Ocean Protection Council (OPC) has issued guidance for State agencies on what level of sea level rise to consider. The Guidance document provides the following estimates of sea level rise for the California Coast, which are based on a study by the National Academy of Sciences:

Time Period	North of Cape Mendocino	South of Cape Mendocino
2000 - 2030	-4 to 23 cm (-0.13 to 0.75 ft)	4 to 30 cm (0.13 to 0.98 ft)
2000 - 2050	-3 to 48 cm (-0.1 to 1.57 ft)	12 to 61 cm (0.39 to 2.0 ft)
2000 - 2100	10 to 143 cm (0.3 to 4.69 ft)	42 to 167 cm (1.38 to 5.48 ft)

An accompanying OPC resolution recommends that departments base analyses on estimates of sea level rise in the upper two-thirds of the range.

Although rising sea levels are a concern for Cal Expo, we do not anticipate that phenomenon having an impact on the department. However, Cal Expo is identified as a facility that will be used as an evacuation facility housing victims of natural disasters being evacuated and/or displaced. As such, Cal Expo has taken care or will identify opportunities for capital improvements to ensure facilities are properly maintained for 'safe harbor' for those temporary displaced.

Natural Infrastructure to Protect Existing Facilities

EO B-30-15 directs State agencies to prioritize the use of natural and green infrastructure solutions. Natural infrastructure is the "preservation or restoration of ecological systems or the utilization of engineered systems that use ecological processes to increase resiliency to climate change, manage other environmental hazards, or both. This may include, but need not be limited to, flood plain and wetlands restoration or preservation, combining levees with restored natural systems to reduce flood risk, and urban tree planting to mitigate high heat days" (Public Resource Code Section 71154(c)(3)).

As noted above, Cal Expo has recently begun engagement with the Sierra West Group. The construction consultant completed a 'state of the facility report' identifying opportunities for infrastructure improvements with focus on sustainability in project planning.

Understanding the Potential Impacts of Facilities on Communities

Cal Expo is located on 800 plus acers of both developed and undeveloped land. Cal Expo considers itself a 'good neighbor' and regularly engages in talks with surrounding businesses in the Exposition/Ethan Arden corridor.

Vulnerable Populations

Certain populations are more susceptible to the effects of changing climate conditions, and will have less capacity to recover from changing average conditions and more frequent and severe extreme events. A number of factors contribute to vulnerability, often in overlapping and synergistic ways. These can include a number of social and economic factors, and be determined by existing environmental, cultural, and institutional arrangements. Vulnerable populations can include, but are not limited to, people living in poverty; people with underlying health conditions; incarnated populations; linguistically or socially isolated individuals; communities with less access to healthcare or educational resources; or communities that have suffered historic exclusion or neglect. Cal Expo places special emphasis on working with overburdened populations and those most vulnerable to climate change impacts. Certain parts of the population, such as children, the elderly, and the poor can be especially vulnerable to the impacts of climate change. This may be due to susceptibility to health impacts of environmental contaminants, economic status, health status, education or access to information. Cal Expo is also concerned about the potential impacts on human health and the environment in rural/agricultural communities. Some climate change effects such as long-term drought or severe storms have the potential to cause severe effects on local economies. Cal Expo uses the annual State Fair to bring agricultural programs focus on understanding the effective and efficient agricultural best practices and these types of educational programs help industry workers and leaders.

Understanding Climate Risk to Planned Facilities

Cal Expo is not currently in planning for new facilities.

Natural Infrastructure

EO B-30-15 also directs agencies to prioritize natural and green infrastructure solutions. Natural infrastructure is the "preservation or restoration of ecological systems or the utilization of engineered systems that use ecological processes to increase resiliency to climate change, manage other environmental hazards, or both. This may include, but need not be limited to, flood plain and wetlands restoration or preservation, combining levees with restored natural systems to reduce flood risk, and urban tree planting to mitigate high heat days" (Public Resource Code Section 71154(c)(3)).

Cal Expo is not currently in the planning process for new building construction; however, is continually repairing/replacing below ground and above ground infrastructure systems. A result, Cal Expo is partnering with CFSA to ensure Title 24 compliance and, as a purchaser of large planning materials it considers industry best practices in environmental and conservation sustainability.

Full Life Cycle Cost Accounting

EO B-30-15 directs State agencies to employ full life cycle cost accounting in all infrastructure investment. Lifecycle cost accounting includes:

- Considering initial investment costs, as well as lifetime operation and maintenance costs under changing climate conditions, including changing average conditions and increases in extreme events.
- Applying non-market evaluation methods such as travel cost, avoided costs or contingent valuation to capture hard to quantify benefits and costs

Cal Expo has recently begun engagement with the Sierra West Group. The construction consultant completed a 'state of the facility report' identifying opportunities for infrastructure improvements with focus on sustainability in project planning. The facility evaluations will include a detailed plan on infrastructure lifecycle, Title 24 code requirements, and energy efficient system upgrades and replacement schedules. Cal Expo is considered the 'fall back seat of State Government' in the event of a loss of facility/resources at the State Capital. As such, it is imperative that Cal Expo consider climate change impacts as the project planning process is completed.

Integrating Climate Change into Department Planning and Funding Programs

Table 10: Integration of Climate Change into Department Planning

Plan	Have you integrated climate?	If no, when will it be integrated?	If yes, how has it been integrated?
Irrigation Systems	Yes	September 2017	Smart Technology

Table 11: Engagement and Planning Processes

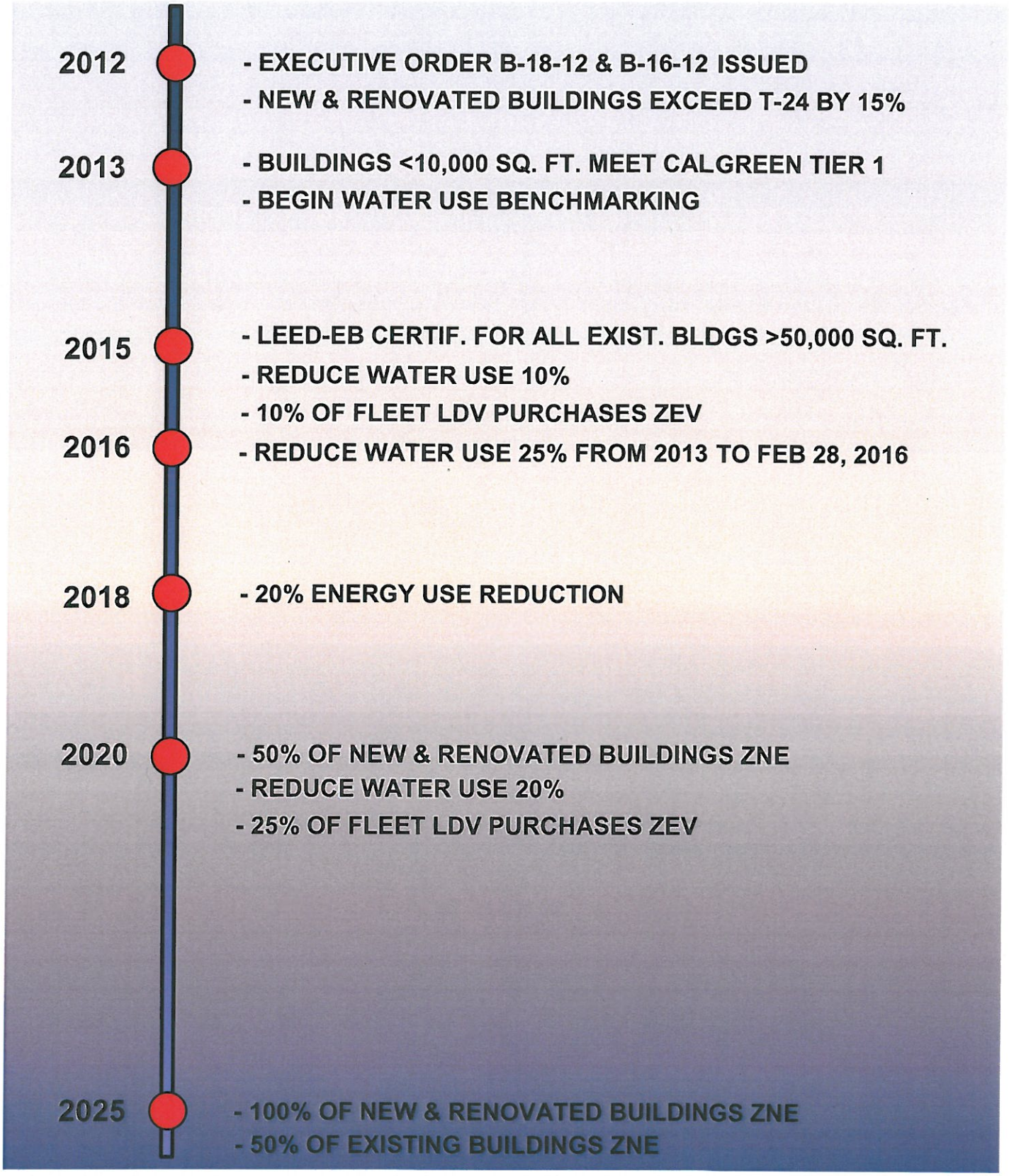
Plan	Does this plan consider impacts on vulnerable populations?	Does this plan include coordination with local and regional agencies?	Does this plan prioritize natural and green infrastructure?
Facility Evaluation	Yes	When Applicable	Yes

Yes, as indicated in the Irrigation Evaluation Study noted above.

Measuring and Tracking Progress

Cal Expo is consistently measuring outcomes as it relates to energy consumption, water use and conservation, and waste management. In addition, Cal Expo has partnered with CFSA to ensure Title 24 compliance and considerations in project planning. Cal Expo is partnering with SMUD to identify opportunities to improve participating in the Zero Emission Vehicles, purchases energy efficient HVAC systems that reduce greenhouse gasses, considers environmentally friendly building construction projects (i.e., re-roofing projects), improving efficiencies in existing buildings and facilities, improving indoor environmental quality, and community, stakeholder, and oversight engagement. Cal Expo is committed to the Sustainability Climate Change Adaptation.

SUSTAINABILITY MILESTONES & TIMELINE



DEPARTMENT STAKEHOLDERS

Understanding Climate Risk at Existing Facilities	
Robert Murray Stroud	Chief of Plant Operations

Understanding Climate Risk at Planned Facilities	
	No new facilities are planned at this time.

Integrating Climate Change into Department Planning and Funding Programs	
Robert Murray Stroud	Chief of Plant Operations
Marcia Shell	Assistant General Manager, Operations

Measuring and Tracking Progress	
Robert Murray Stroud	Chief of Plant Operations
Marcia Shell	Assistant General Manager, Operations